WORLDWIDE PDB
PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report ⓘ

Oct 5, 2023 – 05:31 AM EDT

PDB ID : 6VVB
Title : Mycobacterium tuberculosis dihydrofolate reductase in complex with 6-methyl-5-(4-phenylthiazol-2-yl)-2- (trifluoromethyl)nicotinic acid (fragment 10)
Authors : Tyrakis, P.; Dias, M.V.B.
Deposited on : 2020-02-17
Resolution : 1.45 Å(reported)

The following versions of software and data (see references ⓘ) were used in the production of this report:

MolProbity	:	FAILED
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	FAILED
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35.1

1   Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 1.45 Å.

There are no overall percentile quality scores available for this entry.

MolProbity and EDS failed to run properly - the sequence quality summary graphics cannot be shown.

2　Entry composition ⓘ

There are 5 unique types of molecules in this entry. The entry contains 1506 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Dihydrofolate reductase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	160	Total	C	N	O	S	0	1	0
			1257	792	230	230	5			

- Molecule 2 is 6-methyl-5-(4-phenyl-1,3-thiazol-2-yl)-2-(trifluoromethyl)pyridine-3-carboxylic acid (three-letter code: RQ4) (formula: $C_{17}H_{11}F_3N_2O_2S$) (labeled as "Ligand of Interest" by depositor).
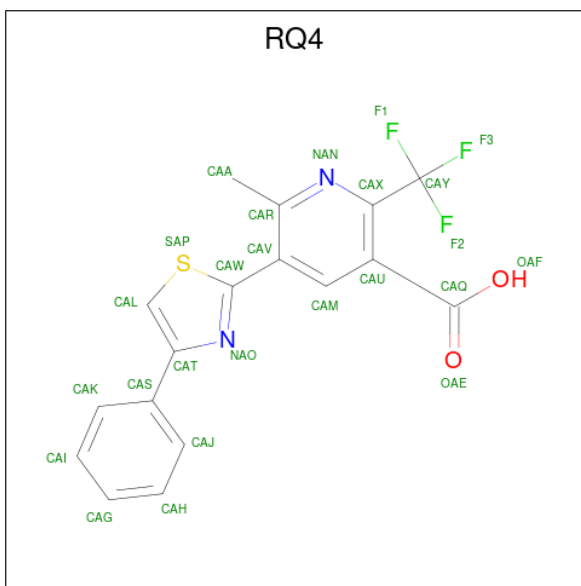
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total	C	F	N	O	S	0	0
			25	17	3	2	2	1		

- Molecule 3 is 3,6,9,12,15,18-HEXAOXAICOSANE-1,20-DIOL (three-letter code: P33) (formula: $C_{14}H_{30}O_8$).

P33
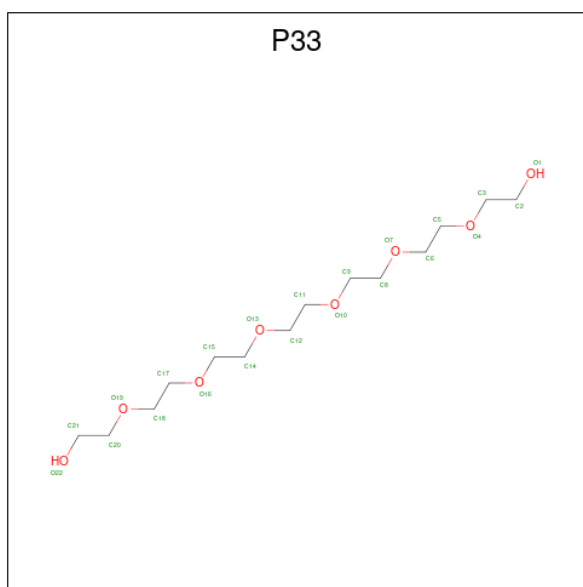
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total 22	C 14	O 8	0	0

- Molecule 4 is NADP NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NAP) (formula: $C_{21}H_{28}N_7O_{17}P_3$).

NAP
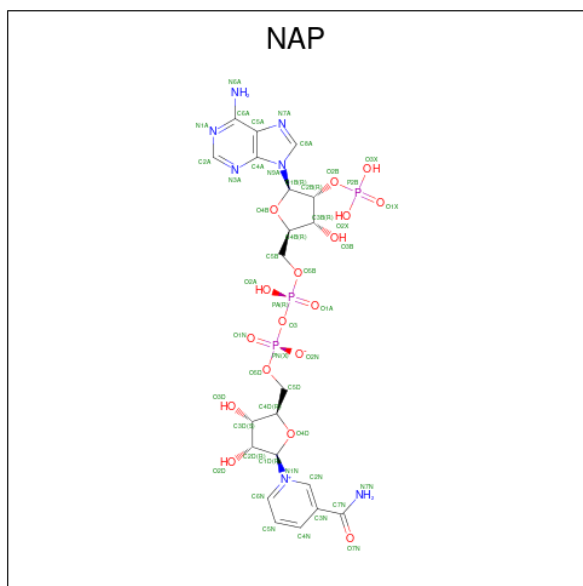
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total 48	C 21	N 7	O 17	P 3	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	154	Total O 154 154		0	0

MolProbity and EDS failed to run properly - this section is therefore empty.

3 Data and refinement statistics ⓘ

EDS failed to run properly - this section is therefore incomplete.

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	67.86Å　73.73Å　36.78Å 90.00°　99.89°　90.00°	Depositor
Resolution (Å)	27.62　–　1.45	Depositor
% Data completeness (in resolution range)	88.0 (27.62-1.45)	Depositor
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	4.08 (at 1.45Å)	Xtriage
Refinement program	PHENIX 1.14	Depositor
R, R_{free}	0.147　,　0.180	Depositor
Wilson B-factor (Å^2)	14.9	Xtriage
Anisotropy	0.074	Xtriage
L-test for twinning[2]	$< |L| > = 0.48, < L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	1506	wwPDB-VP
Average B, all atoms (Å^2)	23.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 9.29% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

4 Model quality ⓘ

4.1 Standard geometry ⓘ

MolProbity failed to run properly - this section is therefore empty.

4.2 Too-close contacts ⓘ

MolProbity failed to run properly - this section is therefore empty.

4.3 Torsion angles ⓘ

4.3.1 Protein backbone ⓘ

MolProbity failed to run properly - this section is therefore empty.

4.3.2 Protein sidechains ⓘ

MolProbity failed to run properly - this section is therefore empty.

4.3.3 RNA ⓘ

MolProbity failed to run properly - this section is therefore empty.

4.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

4.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

4.6 Ligand geometry ⓘ

3 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond

length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#|Z| > 2$	Counts	RMSZ	$\#|Z| > 2$
4	NAP	A	203	-	45,52,52	4.58	22 (48%)	56,80,80	3.08	11 (19%)
3	P33	A	202	-	21,21,21	0.53	0	20,20,20	0.35	0
2	RQ4	A	201	-	25,27,27	2.15	6 (24%)	30,40,40	2.48	11 (36%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	NAP	A	203	-	-	5/31/67/67	0/5/5/5
3	P33	A	202	-	-	9/19/19/19	-
2	RQ4	A	201	-	-	4/16/18/18	0/3/3/3

All (28) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	203	NAP	C2D-C1D	-16.34	1.29	1.53
4	A	203	NAP	C3D-C4D	-9.29	1.29	1.53
4	A	203	NAP	C4N-C3N	9.15	1.55	1.39
4	A	203	NAP	O4D-C1D	8.55	1.53	1.41
4	A	203	NAP	C3B-C4B	-8.26	1.31	1.53
4	A	203	NAP	C5N-C4N	7.59	1.54	1.38
4	A	203	NAP	O4B-C4B	6.71	1.60	1.45
4	A	203	NAP	C6N-C5N	6.55	1.53	1.38
4	A	203	NAP	C2N-C3N	5.08	1.46	1.39
2	A	201	RQ4	F3-CAY	4.67	1.49	1.32
2	A	201	RQ4	F1-CAY	4.56	1.49	1.32
2	A	201	RQ4	CAS-CAT	-4.53	1.41	1.48
4	A	203	NAP	O4B-C1B	-4.43	1.34	1.41
4	A	203	NAP	C2D-C3D	4.23	1.64	1.53
4	A	203	NAP	C7N-N7N	4.16	1.40	1.33
4	A	203	NAP	C6A-N6A	4.12	1.49	1.34
4	A	203	NAP	O4D-C4D	4.08	1.54	1.45
4	A	203	NAP	P2B-O2B	4.08	1.67	1.59
2	A	201	RQ4	F2-CAY	3.69	1.46	1.32
4	A	203	NAP	C6N-N1N	3.41	1.43	1.35

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	203	NAP	C2N-N1N	3.24	1.38	1.35
4	A	203	NAP	C5A-C4A	-2.98	1.33	1.40
4	A	203	NAP	C5D-C4D	2.87	1.60	1.51
2	A	201	RQ4	CAW-NAO	2.70	1.35	1.31
2	A	201	RQ4	CAM-CAV	2.59	1.44	1.39
4	A	203	NAP	O3B-C3B	2.48	1.48	1.43
4	A	203	NAP	O2D-C2D	2.31	1.48	1.43
4	A	203	NAP	O2B-C2B	-2.21	1.36	1.44

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	203	NAP	C5A-C6A-N6A	15.47	143.86	120.35
4	A	203	NAP	N6A-C6A-N1A	-10.51	96.77	118.57
4	A	203	NAP	C5N-C4N-C3N	-6.98	112.09	120.34
2	A	201	RQ4	F1-CAY-CAX	-5.74	103.33	112.32
4	A	203	NAP	N3A-C2A-N1A	-5.65	119.85	128.68
4	A	203	NAP	O7N-C7N-C3N	4.69	125.25	119.63
2	A	201	RQ4	F3-CAY-CAX	-4.64	105.06	112.32
2	A	201	RQ4	CAL-CAT-CAS	-4.50	123.18	129.44
4	A	203	NAP	C2N-C3N-C4N	4.45	123.30	118.26
2	A	201	RQ4	CAR-NAN-CAX	4.37	124.55	119.16
2	A	201	RQ4	CAA-CAR-NAN	-3.85	110.53	116.49
4	A	203	NAP	C3N-C7N-N7N	-3.47	113.59	117.75
2	A	201	RQ4	CAH-CAJ-CAS	-3.42	116.26	120.56
2	A	201	RQ4	OAF-CAQ-OAE	-3.02	116.64	123.35
2	A	201	RQ4	CAV-CAR-NAN	-2.95	119.58	122.10
2	A	201	RQ4	CAA-CAR-CAV	2.89	129.88	122.84
2	A	201	RQ4	F3-CAY-F2	2.75	115.81	105.72
2	A	201	RQ4	CAS-CAT-NAO	2.52	125.02	120.78
4	A	203	NAP	C1B-N9A-C4A	2.30	130.68	126.64
4	A	203	NAP	C2N-N1N-C1D	-2.04	114.59	119.14
4	A	203	NAP	O4D-C1D-C2D	-2.02	103.98	106.93
4	A	203	NAP	C3B-C2B-C1B	-2.01	99.11	102.89

There are no chirality outliers.

All (18) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	203	NAP	O4D-C1D-N1N-C2N
4	A	203	NAP	O4D-C1D-N1N-C6N
4	A	203	NAP	C2D-C1D-N1N-C2N

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Mol	Chain	Res	Type	Atoms
4	A	203	NAP	C2D-C1D-N1N-C6N
3	A	202	P33	O4-C5-C6-O7
3	A	202	P33	O16-C17-C18-O19
3	A	202	P33	O7-C8-C9-O10
4	A	203	NAP	PA-O3-PN-O5D
3	A	202	P33	C2-C3-O4-C5
3	A	202	P33	C5-C6-O7-C8
3	A	202	P33	C14-C15-O16-C17
2	A	201	RQ4	OAE-CAQ-CAU-CAX
3	A	202	P33	O10-C11-C12-O13
2	A	201	RQ4	OAF-CAQ-CAU-CAX
2	A	201	RQ4	OAE-CAQ-CAU-CAM
3	A	202	P33	O19-C20-C21-O22
2	A	201	RQ4	OAF-CAQ-CAU-CAM
3	A	202	P33	C9-C8-O7-C6

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand NAP A 203

Bond lengths

Bond angles

Torsions

Rings

Ligand P33 A 202

Bond lengths

Bond angles

Torsions

Rings

Ligand RQ4 A 201

Bond lengths

Bond angles

Torsions

Rings
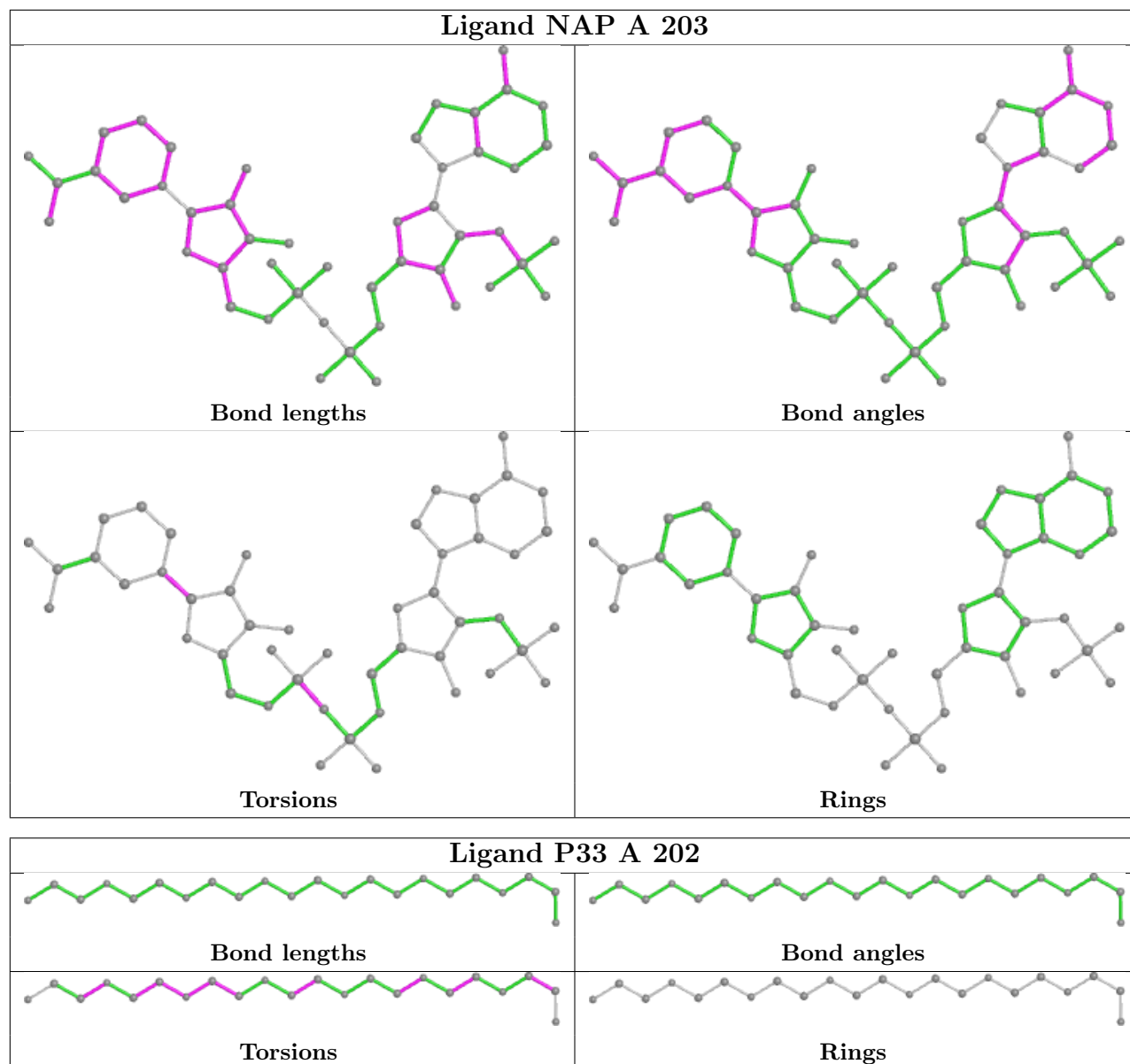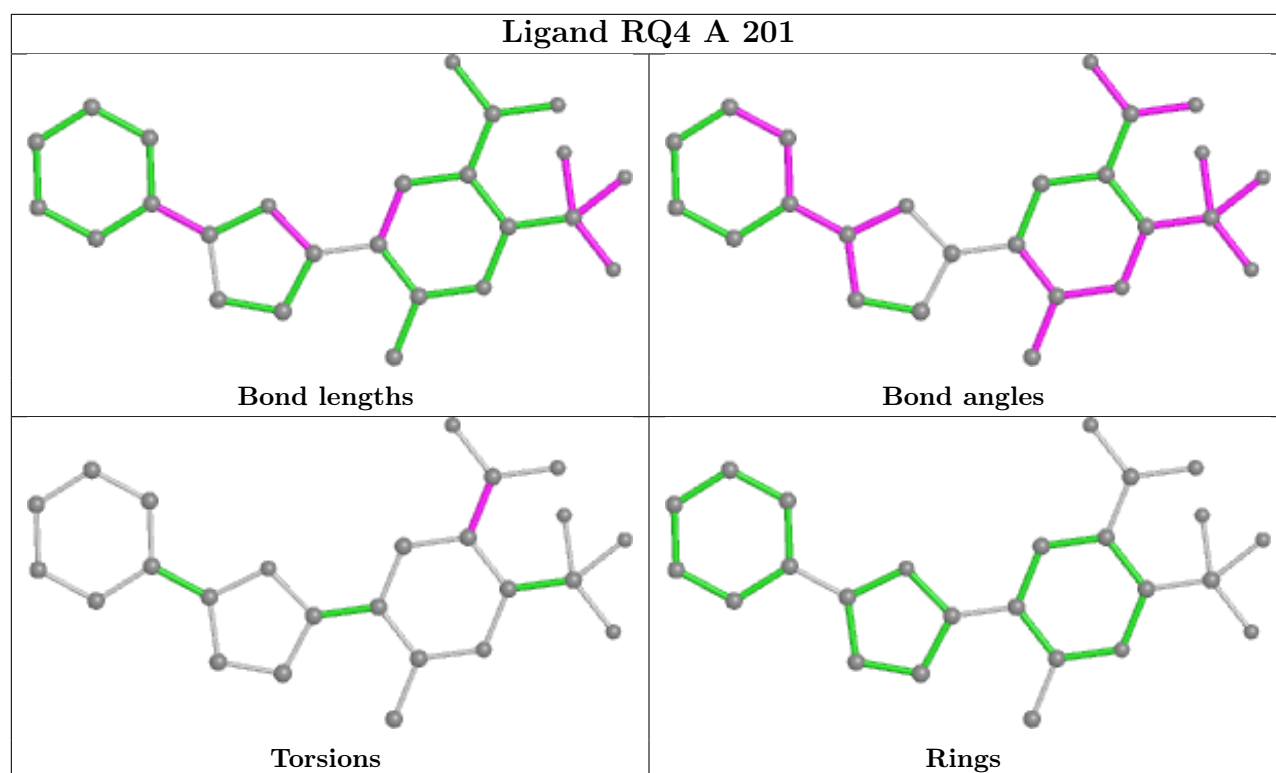
4.7 Other polymers ⓘ

There are no such residues in this entry.

4.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

5 Fit of model and data ⓘ

5.1 Protein, DNA and RNA chains ⓘ

EDS failed to run properly - this section is therefore empty.

5.2 Non-standard residues in protein, DNA, RNA chains ⓘ

EDS failed to run properly - this section is therefore empty.

5.3 Carbohydrates ⓘ

EDS failed to run properly - this section is therefore empty.

5.4 Ligands ⓘ

EDS failed to run properly - this section is therefore empty.

5.5 Other polymers ⓘ

EDS failed to run properly - this section is therefore empty.